

Complications of Total Elbow Arthroplasty

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I. General

- A. Complications of elbow arthroplasty have been reported to be very high (57%). More recently, there was a general consensus that the complication rates have fallen dramatically as there have been improvements in patient selection, surgical exposure component design, and rehabilitation protocols.
- B. As with all discussions of complications, the major benefit of reviewing this topic is for avoidance. As a general rule, treatment of complications will never recover the same result as avoidance of complications.
- C. The major sub-category of elbow complications include:
 - 1. Infection, reported to be anywhere from 2-11%
 - 2. Wound complications
 - 3. Instability of unlinked prosthesis, reported to be 0-14%
 - 4. Premature loosening of components, 3-12%.
 - 5. Intraoperative fractures, which are reported to be anywhere from 1-23%
 - 6. Triceps insufficiency, to a significant degree in up 60% of patients
 - 7. Ulnar neuropathy, seen in about 0-10%

II. Infection

- A. Whereas many of complications listed above have been minimized significantly with recent improvements in surgical technique, infection has remained a significant concern. Infection is among the more devastating complications usually requiring multiple operations at best and complete and permanent removal of a prosthesis at worst.
- B. Recovery from this complication is generally long and arduous and can have significant effects on overall patient health.
- C. Risk Factors
 - 1. There are multiple risk factors for infection associated with total elbow arthroplasty. These include:
 - a) The subcutaneous location of the joint and poor soft tissue coverage.
 - b) Total elbow arthroplasty is commonly offered to patients with inflammatory arthritis on immunocompromising medications.

- c) Generally total elbow arthroplasty is reserved for elderly patients who are less healthy.

D. Diagnosis

1. The timing of diagnosis is critical to elbow function and treatment. In general, an infection diagnosed within the first 3 weeks of onset, offers opportunities for salvage of the implant. Diagnostic criteria for infection include:
 - a) Elevated white count
 - b) Elevated ESR
 - c) Elevated CRP
 - d) Local signs of infection including erythema, redness, or swelling
 - e) Aspirate including positive gram stain or cell count greater than 75,000
 - f) Positive culture on aspirate
2. In general, a diagnosis infection is made with either 2 scenarios:
 - a) High clinical suspicion in the context of positive values for the above criteria or
 - b) Positive cultures on elbow aspirate, especially 2 separate cultures showing the same organism.
 - c) Intraoperative criteria include high numbers of PMNs seen on frozen section.

E. Treatment of Infections

1. Early infection found within 3-4 weeks can be retained if the component is stable and the organism is not staph epidermidis. Late infections or infections treated in the context of unstable components require 2 stage reimplantation with a minimum period of 6 weeks of IV antibiotics between stages. If the patient is unhealthy and cannot tolerate multiple surgeries, a resection arthroplasty may be necessary.

III. Wound complications

- A. Relatively common for total elbow arthroplasty and are related to subcutaneous location of the elbow. The occurrence of these wound complications have been significantly minimized by more modern approaches including the medial triceps slide of Bryan/Morrey and/or the lateral triceps slide of Koker.
- B. When wound problems occur, aggressive and early management is essential to avoid the added complication of infection. Generally, early plastic surgery consultation is necessary.

C.

IV. Instability

- A. Instability is essentially a complication of unlinked prosthesis. This complication can be minimized significantly with proper preoperative indications. Generally an unlinked prosthesis should be only performed in the context of:
 1. Relatively preserved bony articulation

2. Normal dynamic control ie normal neurologic function
 3. Intact ligaments
- B. The exception to the above indications are in the use of unlinked prosthesis which are designed to be “sloppy” in their articulation. The Kudo prosthesis is an example of this in which the prosthesis can remain quite functional despite a large degree of medial-lateral slide.
- C. Treatment usually involves either a ligament reconstruction in those situations where component alignment is reasonably good, bony stock is reasonably good, and biologic issues (inflammatory arthritis) preclude normal ligament healing. Alternative treatment would be revision to a link prosthesis.

V. Loosening

- A. Loosening is most commonly association with link prosthesis. As the longevity of these prostheses has improved, osteolysis secondary to particle debris has become more of a problem. Loosening generally occurs more commonly with modern prosthesis on the ulnar side. Infection must be excluded when large periarticular osteolysis is seen. Generally periarticular osteoarthritis are secondary to particulate debris. Sources include:
1. Polyethylene wear
 2. Cement debris secondary to de-bonding of the precoat
 3. Metal debris from bushing wear
- B. Treatment includes:
1. Exchange of bushings and synovectomy at the very early stages of osteolysis.
 2. Removal of component with immediate reimplantation using impaction bone grafting.
 3. Removal of component with composite intercalary allograft reconstruction

VI. Fractures

- A. Generally the reported incidence of perioperative fractures have been quite low. The surgeon should be very cognizant of this possibility, however, as the bone is often very osteoporotic. Sources of fracture include long stem humeral components which do not account for the humeral bowl.
- B. Ulnar fractures secondary to the proximal ulnar bowel.
- C. Treatment includes long stem intermedullary fixation of fracture plus or minus allograft reconstruction.

VII. Triceps Insufficiency

- A. Triceps insufficiency to some extent is seen in nearly every case. Usually reasonable triceps strength can be preserved with a triceps reflecting approach. Triceps sparing approaches, which can be performed in fractures or with difficulty in non-fracture situations generally retain nearly all the triceps function.

VIII. Ulnar Neuropathy

- A. Ulnar neuropathy has been generally seen in cases without transposition of the nerve. Standard transposition of the nerve will generally avoid this

complication, although meticulous handling of the perineal structures and associated vascular supply is important to avoid iatrogenic injury.